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Shaw™
Shaw E & I, Inc.

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Geotechnical Laboratory
PO Box 4339
1570 Bear Creek Road
Oak Ridge TN 37830
(865) 482-6497

CERTIFICATE OF ANALYSIS

Stephen Trent
Fluor Hanford, Inc.
825 Jadwin Avenue
Richland, Washington 99352

January 18, 2005
F03-006

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	**Eberline - Hanford**
Shaw Project Number:	**100846.38000000**
Client Sample Data Group:	H2860
Date Received by Lab:	December 6, 2004
Number of Samples:	One (1)
Sample Type:	Soil

I. Introduction/Case Narrative

One soil sample was received by the Shaw Geotechnical Laboratory on December 6, 2004. The sample was submitted for determination of moisture content, bulk density, and sieve analysis. The sample number received was B1B5H0.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole
Laboratory Manager, Geotechnical Services

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II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock..... **ASTM D 2216**
Bulk Density of Soils..... **EM 1110-2-1906**
Particle-size Analysis of Soils ..... **ASTM D 422**

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.
- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

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- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.

- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

None.

Appendix A
Sample Cross-Reference List

January 18, 2005
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Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.38000000
SDG No. H2860

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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC0489	B1B5H0	Soil

Appendix B
Sample Test Results

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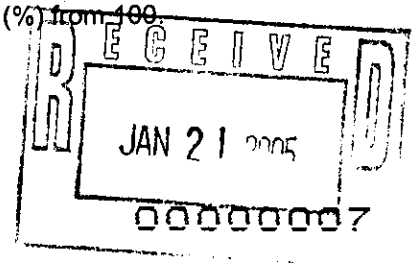
MOISTURE CONTENT

PROJECT NAME
Eberline - Hanford

PROJECT NUMBER
100846.38000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MOISTURE, % ASTM D 2216	MOISTURE , % SW846	SOLIDS, % SW846
BC0489	B1B5H0	2.6	2.6	97.4

ASTM D 2216 results are based on dry sample weight.
SW846 results are based on wet sample weight.
Solids content is determined by subtracting the SW846 moisture (%) from 100.



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BULK DENSITY/DRY DENSITY
EM-1110-2-1906, APPENDIX II

PROJECT NAME: **Eberline - Hanford**

PROJECT NUMBER: **100846.38000000**

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH, inches	AVERAGE DIAMETER, inches	WET WEIGHT, grams	MOISTURE CONTENT, %	BULK DENSITY, pcf	DRY DENSITY, pcf
BC0489	B1B5H0	5.2797	3.8690	2417.63	2.8	148.4	144.4

Moisture content calculated by ASTM D 2216 based on sample dry weight.
Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).
Dry density is the weight of the dry sample solids divided by the volume of the original sample.

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PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberline Hanford

Project No. 100846.38000000

Field Sample No. B1B5H0

Lab Sample No. BC0489

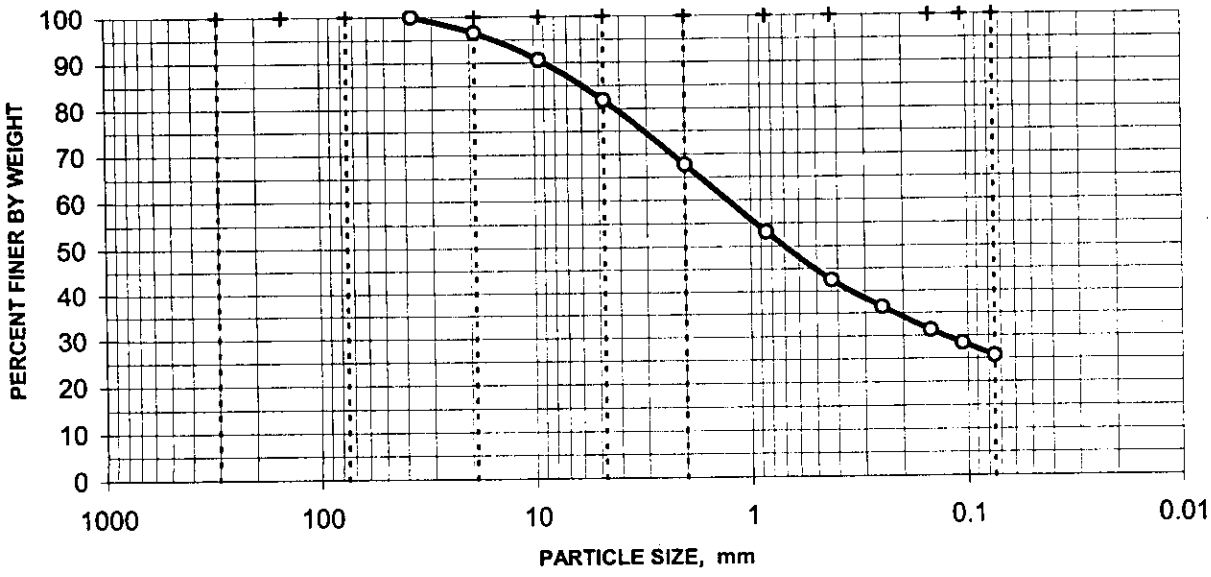
Moisture Content = 2.8%
based on dry sample weight

SIEVE ANALYSIS

	Sieve No.	Diameter mm	Percent Finer
COARSE	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	96.5%
	0.375"	9.500	90.6%
	#4	4.750	81.8%
	#10	2.000	67.7%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	53.1%
	#40	0.425	42.5%
	#60	0.250	36.4%
	#100	0.149	31.2%
	#140	0.106	28.4%
	#200	0.075	25.6%

DISTRIBUTION CURVE



18.2% Gravel 56.2% Sand 25.6% Silt/Clay

Appendix C
Chain-of-Custody and Request-for-Analysis Records

FLUOR Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-006-313	PAGE 1 OF 1

COLLECTOR Pope/Pfister/Wiberg/Tyra	**COMPANY CONTACT** LC Hulstrom **TELEPHONE NO.** 373-3928	**PROJECT COORDINATOR** TRENT, SJ	**PRICE CODE** 8N **DATA TURNAROUND** 45 Days / 45 Days
SAMPLING LOCATION 200-PW2/216-S-7, 54-56.5 ft	**PROJECT DESIGNATION** 200-PW-2/200-PW-4 OU - Borehole Soil Sampling	**SAF NO.** F03-006	**AIR QUALITY** ☐
ICE CHEST NO. GRP-03-017	**FIELD LOGBOOK NO.** HNF-N-336 1 **COA** 119153ES10	**METHOD OF SHIPMENT** Federal Express	
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** See PTR 14504	**BILL OF LADING/AIR BILL NO.** See PTR 14504	

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegitation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
SDG# H2860

SPECIAL HANDLING AND/OR STORAGE
RADIOACTIVE TIE TO: B1B588

PRESERVATION	None	None
TYPE OF CONTAINER	Moisture Resistant Cont	Split Spoon Liner
NO. OF CONTAINER(S)	1	1
VOLUME	200g	1000g
SAMPLE ANALYSIS	Moisture Content - D2216;	Particle Size (Dry Sieve) - D422; Bulk Density D2937

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B1B5H0	SOIL	11/22/04	1330	x	x

BC 0489

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Kevin D HUGHES [illegible]	11-22-04 14:30	S-7 site fridge	11-22-04 14:30
S-7 site fridge	11-23-04 / 14:30	Kevin HUGHES [illegible]	11-23-04 14:30
Kevin D HUGHES [illegible]	11-23-04 1540	mo [illegible] site fridge #3	11-23-04 1540
[illegible]	12/1/04 0930	M.H. Buckley [illegible]	12/1/04 0935
M.H. Buckley [illegible]	12/1/04 0935	Fed Ex	
Fed Ex	12/2/04 9:40	[illegible]	12/2/04 10:30
[illegible]	12/2/04 4:00	Fed Ex	

SPECIAL INSTRUCTIONS
To SHAW

LABORATORY SECTION	**RECEIVED BY** [illegible]	**TITLE** SHAW	**DATE/TIME** 12/06/04 @ 1000
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

0000011

SDG# H2860

PAGE 1 Eberline Srvces CHAIN OF CUSTODY ORD # R4-12-012

12/02/04 14:46:38 WORK ID: SAF# F03-006 SDG H2860

RCVD: 12/02/04 DUE: 01/16/05 KEEP: 01/16/06 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS
01A-S	B1B5H0	SHAW	DISPOS E331S E333S E335S

BC 0489

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
[signature]	12/2/04	SHAW LAB	12/2/04	[signature]	12/6/04

00000012